

INTRODUCCIÓN A LA INVESTIGACIÓN SEVERO OCHOA 2022
RESEARCH PROJECT: POSITIVITY IN OPERATOR THEORY

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Ordered structures are a common framework for a myriad of mathematical problems. In an ordered space X (either finite dimensional like \mathbb{R}^n , or infinite dimensional like a space of real valued functions on some larger set) a linear operator $T : X \rightarrow X$ is called positive when it maps the positive cone $X_+ = \{x \in X : x \geq 0\}$ into itself. This induces an ordered structure at the level of operators by setting $S \leq T$ whenever $T - S$ is positive.

A surprising feature of this ordered structure is that it is linked to several seemingly unrelated topological notions. One can wonder for instance under which conditions a certain topological property of a positive operator T , is inherited by every operator satisfying $0 \leq S \leq T$. We will explore the many properties that satisfy this sort of scheme, including compactness, singularity and spectral properties. Several open problems in this area will allow the student to grasp up-to-date research and learn ideas from spectral theory, operator ideals and Banach lattices.

In order to properly profit from this project it is highly recommended to have gone through a basic course in Functional Analysis.

REFERENCES

- [1] Y. A. Abramovich, C. D. Aliprantis, An invitation to operator theory. Graduate Studies in Mathematics, 50. American Mathematical Society, Providence, RI, 2002.
- [2] J. Flores, F. L. Hernández, P. Tradacete, Domination problems for strictly singular operators and other related classes. Positivity 15 (2011), no. 4, 595–616.